Anderson Dam Seismic Retrofit (C1)

Project Number: 61-91864005

PROJECT PLAN

(PRINTED COPIES ARE FOR REFERENCE ONLY)

	Reviewer:	Project Owner:
	Christopher Hakes	Christopher Hakes
Plan Approval Date:		4/11/2022
Project Manager (s):	Emmanuel Aryee	

Santa Clara Valley Water District

Anderson Dam Seismic Retrofit (C1)

Project Number: 61-91864005

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Why do this project *

In 2011, the District completed a seismic study of Anderson Dam, which indicated that material at the base and foundation of the dam embankment would weaken due to liquefaction in a 7.25 magnitude maximum credible earthquake (MCE) on the Calaveras Fault, located approximately 1.2 miles from the dam or a 6.6 Magnitude MCE on the Coyote Creek fault located directly under the dam. Such an event could significantly deform the dam embankment, risking an uncontrolled release from Anderson Reservoir. The 2011 study also indicated that an MCE could trigger fault offset on the conditionally active Range Front Fault traversing under the dam and, which would rupture the existing outlet pipe. The District initiated the Anderson Dam Seismic Retrofit Project in 2012 to address the seismic deficiencies at the dam. The Project's Planning Phase was completed in July 2013, and the proposed retrofit project was described in a Planning Study Report provided to the Board via a Non-Agenda Memorandum in August 2013. The Design Phase was initiated soon thereafter, when the Board approved a consultant agreement with URS Corporation for Project design services on August 27, 2013. Since 2009, the District has operated Anderson Reservoir under a restricted water level (approved by the California Department of Water Resources, Division of Safety of Dams [DSOD]) as an interim risk reduction measure while the Project is being designed. DSOD does not allow water level restrictions as a permanent means to provide dam safety.

History and Background *

Anderson Dam Seismic Study

On January 23, 2007, the District retained AMEC Geomatrix to perform a Seismic Stability Study for Anderson Dam. A preliminary study completed in December 2008 concluded that the downstream slope of Anderson Dam could be unstable in a large magnitude earthquake and could experience large deformations and slumping. The preliminary analysis was based on simplified methods, very limited data, and worst-case assumptions about the extent of alluvial material under the dam.

On January 13, 2009, the Board approved an amended consultant contract with AMEC Geomatrix, Inc. to add extensive field explorations, laboratory testing, and detailed engineering analyses. An evaluation of the fault rupture hazard to the dam and outlet works was also added to the scope. The preliminary findings of this study indicate that the downstream slope of the dam could become unstable and that the upstream slope and dam crest could experience excessive deformation during a very large magnitude earthquake. This is due to the presence of poorly compacted, liquefiable soil layers including: a) a 5- to 10-feet thick layer of weak fill material at the bottom of the downstream dam shell; and b) a weak alluvial material under portions of the upstream shell. These weak soil layers are susceptible to a loss in strength when subjected to severe seismic shaking.

The preliminary findings were discussed with the regulatory agencies, the California Division of Safety of Dams (DSOD) and the Federal Energy Regulatory Commission (FERC), in October, 2010, following presentation and review by the District's Technical Review Board (TRB). DSOD has dam safety jurisdiction over all District dams. FERC is the federal regulatory agency, which has dam safety jurisdiction at Anderson Dam due to the District's Anderson Hydroelectric Facility located approximately 1,100 feet from the dam.

From December 2008 to September 2010, Anderson Dam and reservoir was operated under a DSOD water level restriction of 20 feet below the spillway (74% of the storage capacity of the reservoir). With the preliminary findings of the seismic stability evaluation, the District voluntarily implemented an additional operating restriction in October 2010 to 37 feet below the spillway (about 56% of the reservoir's storage capacity) until the vertical deformation analysis was completed. The vertical deformation analysis was completed in January 2011 and based on the results DSOD revised the operating restriction to elevation 602 feet, which is 26 feet below the spillway or 68% capacity. In December 2016, following the fault rupture analysis by URS, the Interim Risk Reduction Measures were re-evaluated again and the District voluntarily decided to further reduce the operating level to elevation 592 feet, approximately 58% capacity, pending final review of the results of the studies by DSOD and FERC.

Planning Phase & Staff Recommended Alternative (SRA)

The project work through the end of December 2012 consisted of developing project requirements, defining the specific problems to be addressed by this Project, undertaking a Probable Maximum Flood Analysis, and developing conceptual alternatives to seismically retrofit Anderson Dam.HDR developed and evaluated nineteen (19) conceptual alternatives and ranked them on the following seven criteria:

Capital Construction Costs

Construction Risk/Impacts

Project Schedule

Project Description (Highlevel Description to be used in Budget and CIP Documents) *

This project plans, designs, and constructs a seismic retrofit or replacement of outlet works at Anderson Dam, pending completion of a field investigation that will determine whether the Coyote Fault is determined to be "active". Seismic stability improvements will accommplish the following objectives:
Resolve seismic stability deficiencies to ensure public safety. Restore lost reservoir storage capacity resulting from the operational restriction issued by the Division of Safety of Dams (DSOD). Resolve the DSOD & Federal Energy Regulatory Commission (FERC) requirements in a timely manner.

Project Objectives *

The Anderson Dam Seismic Retrofit Project objective is to:
Make improvements necessary to stabilize the dam embankment for the maximum credible earthquake (MCE), to meet Federal Energy Regulatory Commission (FERC) regulations and California Department of Water Resources, Division of Safety of Dams (DSOD) requirements,
Replace the outlet works to meet current DSOD emergency drawdown flow requirements, and
Modify the spillway and raise the dam crest to increase freeboard during a Probable Maximum Flood event as required by FERC regualtions.

Current Fiscal Year Milestones (Example: Complete 90% Design – Dec 2021) *

1. Commence Tunnel Construction - April 2021
2. Final Biological Assessment - April 2021

Budget Fiscal Year 1 Milestones (Example: Advertise for Construction – April 2023) *

FY23:
- Submit CDFW, USACE, and State Board permit applications – August 2022
- Finalize EIR – December 2022
- Complete 100% design – April 2023
- Final project Approval from DSOD and FERC – June 2023

Budget Fiscal Year 2 Milestones (Example: Complete O&M Transition Report – Jan 2024) *

FY24:
- Advertise project for construction – August 2023
- Award construction contract – January 2024

Criteria *

Project criteria will be developed through the planning process.
Retrofits to the dam and outlet will be in accordance with DSOD and FERC requirements.
Retrofit work will include the installation of updated surveillance and monitoring instrumentation that meet the standards of care to address physical dam movement and water movement through the dam.

Constraints *

The Owner has determined that timely completion of the project is a constraint due to the severity of the operational restriction, and its impact on local water supply.
The Valley HCP requires that Coyote Ceanothus mitigation be completed in advance of construction. Specifically, the plan states that the District will develop and implement a plan for Coyote Ceanothus at least two years prior to the impact.
The San Francisco Collinsia mitigation was not included in the Valley HCP and will require a separate take permit. The originally proposed mitigation planting had to be stable or growing in size for at least 10 years prior to the impact.
Other constraints will be determined through the planning process.

Assumptions *

The updated expenditure table includes the preliminary construction cost for a dam removal and replacement.
The Project will not increase the capacity of the reservoir.
The Project will not result in the removal of the Anderson Hydroelectric Facility.
DSOD and FERC will find the spillway and dam freeboard to be adequate following modifications to handle the PMF.
The District will be the lead agency for CEQA. FERC will be the lead agency for NEPA, and the Corps of Engineers will be the cooperating agency pertaining to endangered species.
A joint EIR/EIS environmental document will be prepared; a biological opinion will be pursued.
The FAHCE will not be completed in time to aid environmental permitting for this Project.
A separate CEQA document and Engineer's Report is required to purchase reserve property for the Coyote Ceanothus and San Francisco Collinsia mitigation in advance of the Project.
The planning study alternatives will include a retrofit alternative, removal of the dam alternative and the No Project alternative.
It is assumed that the Project will require the purchase of real estate for the retrofit work and for environmental mitigation of endangered species. A placeholder real estate cost has been included in the expenditure table.
Cochrane Road will not require permanent realignment.

Scope of Work *

The scope of work includes 4 phases of the project (planning, design, construction and close-out). Project management and public outreach activities will occur over the life of the project. The District will retain separate consultants to perform project management, planning, design and construction management work. The District will oversee the Project Management Agreement; make decisions which impact the scope, schedule and budget, and lead communications with the Board and the Public.

The project management consultant will manage the work in this Project Plan and the Phase Workplans. The consultant will perform administrative functions such as budget and coordinate with various District/external programs such as FAHCE. The project management consultant will manage all contract and agreements.

1. Planning Phase - The work in the planning phase includes the preparation of the Planning Study Report. The key planning activities will include:
Obtain background data (surveying, mapping, water supply data, seismic findings, PMF findings)
Determine initial stakeholders and stakeholder requirements
Prepare Problem Definition Memo
Develop and evaluate alternatives

Additional In

Project Number: 61-918

Sort Change History

Date

Sort Board Actions

Date

puts: Anderson Dam Seismic Retrofit (C1)

64005

Sources of Funding *

The primary source of funding for this Project is the Water Utility Enterprise Fund (groundwater charges). The project will be 78.8% funded by Zone W-2 (North County) and 21.2% funded by Zone W-5 (South County).
Grant funding was awarded to this project via DWR Prop 84 in the amount of $4,090,000.
The District will pursue additional funding opportunities including other possible grants.

Operating Budget Impacts *

The completion of this project is not anticipated to increase or decrease annual operating costs, as the project does not significantly alter the existing facilities or modes of operation.

Useful Life

50+ years

Change History *Select either column header of the table below and use the insert button on the Vena ribbon to add Chang

Notes

Board Actions *Select either column header of the table below and use the insert button on the Vena ribbon to add Board A

Notes

Glossary of Terms *

*y History **

*Actions **

Authorized?

Project Schedule: Anderson Dam Seismic Retrofit (C

Project Number: 61-91864005

	Approved Start Date
Planning	1/25/2011
Environmental	1/1/2013
Design	9/1/2013
Rights of Way	9/1/2013
Construction	1/1/2021
Close-Out	1/1/2032

Planning		Approved Start Date
1207	Planning Project Management	1/25/2011
1213	Problem Defintion Report	1/25/2011
1214	Conceptual Alternatives Report	
1216	Feasible Alternatives Matrix	
1227	Stakeholder Engagement - Planning	1/25/2011
1290	Planning Study Report	12/1/2011
1299	Transition Report/Close-Out	1/1/2013

Environmental		Approved Start Date
1313	Environmental Review Process	1/1/2013
1321	Environmtl Permit/Agreement	4/1/2017

Design		Approved Start Date
1407	Design Project Management	9/1/2013
1410	Preliminary Design Activity	9/1/2013
1427	Stakeholder Engagement - Design	
1430	30% Design	8/1/2017
1460	60% Design	5/1/2018
1490	90% Design	12/1/2018
1493	Final Design	1/1/2020
1494	Revised Design for Rebid	
1495	Utility Agreements	
1496	Other Permit/Agreement	1/1/2020
1497	Engineer's Report to Board	1/1/2021
1498	Advertise/Award Contract	7/1/2021
1499	Transition Report/Close-Out	

Rights of Way		Approved Start Date
1510	Rights of Way Mapping	12/1/2018
1520	Real Estate Tasks	9/1/2013
1531	ROW Acquisition/Relocation	

Construction		Approved Start Date
1607	Construction Project Management	1/1/2021
1627	Stakeholder Engagement - Const	
1660	Construction Contract Costs	1/1/2021
1665	CM/Inspection	1/1/2021
1666	Eng Support During Construction	1/1/2021
1675	Utility Relocations/Other Services	
1678	Reg Compliance & Monitoring	
1680	Survey & Materials Testing	
1685	Plant Estab/Startup & Commiss	
1687	Board Acceptance of Work	
1688	Contract Legal Issues	
1689	Letter of Map Revision	
1692	Complete As-Builts	1/1/2025
1699	Transition Report/Closeout	1/1/2025

Close-Out		Approved Start Date
1907	Prepare Closeout Report	1/1/2032
1927	Audits/Reimbursement Claims	

Project Schedule Comments

The schedule for the Environmental and Design Phase activities has been updated
information after the completion of the Planning Phase.
March 28, 2011 - All activities were shifted by 4-months as identified in the Chang
Memo dated March 24, 2011.
December 09, 2013 - The schedules has been revised as per the approved change
dated November 26, 2013.
September 21, 2016 - The schedule has been revised as per the approved change
dated Septebmber 14, 2016.
October 24, 2018 - The schedule has been revised as per the approved Change Ma
dated September 6, 2018 (CIP coordinator received signed copy on Oct. 23, 2018)

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Approved End Date	Proposed Start Date	Proposed End Date	Baseline Start Date
8/30/2013	1/25/2011	8/30/2013	1/25/2011
12/30/2022	1/1/2013	12/30/2022	9/1/2012
6/30/2024	9/1/2013	6/30/2024	9/1/2012
12/30/2021	9/1/2013	12/30/2021	9/1/2012
12/30/2031	1/1/2021	12/30/2031	3/1/2016
6/30/2032	1/1/2032	6/30/2032	12/31/2018

Approved End Date	Proposed Start Date	Proposed End Date	Baseline Start Date
8/30/2013	1/25/2011	8/30/2013	1/25/2011
2/1/2012	1/25/2011	2/1/2012	1/25/2011
4/30/2013	1/25/2011	4/30/2013	1/25/2011
8/30/2013	12/1/2011	8/30/2013	8/1/2011
8/30/2013	1/1/2013	8/30/2013	9/1/2012

Approved End Date	Proposed Start Date	Proposed End Date	Baseline Start Date
6/30/2021	1/1/2013	6/30/2021	9/1/2012
12/30/2022	4/1/2017	12/30/2022	9/1/2014

Approved End Date	Proposed Start Date	Proposed End Date	Baseline Start Date
12/30/2021	9/1/2013	12/30/2021	9/1/2012
3/30/2014	9/1/2013	3/30/2014	
4/30/2018	8/1/2017	4/30/2018	
11/30/2018	5/1/2018	11/30/2018	
12/30/2019	12/1/2018	12/30/2019	
12/30/2021	1/1/2020	12/30/2021	9/1/2012
12/30/2021	1/1/2020	12/30/2021	9/1/2014
6/30/2024	1/1/2021	6/30/2024	
6/30/2024	7/1/2021	6/30/2024	9/1/2015

Approved End Date	Proposed Start Date	Proposed End Date	Baseline Start Date
12/30/2019	12/1/2018	12/30/2019	9/1/2012
12/30/2021	9/1/2013	12/30/2021	9/1/2014

Approved End Date	Proposed Start Date	Proposed End Date	Baseline Start Date
12/30/2031	1/1/2021	12/30/2031	3/1/2016
			3/1/2016
12/30/2031	1/1/2021	12/30/2031	3/1/2016
12/30/2031	1/1/2021	12/30/2031	3/1/2016
12/30/2031	1/1/2021	12/30/2031	3/1/2016
			6/30/2018
12/30/2031	1/1/2025	12/30/2031	6/30/2018
12/30/2031	1/1/2025	12/30/2031	12/31/2018

Approved End Date	Proposed Start Date	Proposed End Date	Baseline Start Date
6/30/2032	1/1/2032	6/30/2032	12/31/2018

l to reflect current
ge Management
management memo
management memo
anagement Memo
.

Baseline End Date
12/30/2012
9/1/2015
3/1/2016
9/1/2015
6/30/2019
6/30/2019

Baseline End Date
12/30/2012
10/1/2011
12/30/2012
9/1/2012
12/1/2012

Baseline End Date
9/1/2014
9/1/2015

Baseline End Date
9/1/2015
9/1/2014
3/1/2015
3/1/2016

Baseline End Date
9/1/2014
9/1/2015

Baseline End Date
6/30/2018
6/30/2018
6/30/2018
6/30/2018
6/30/2018
12/31/2018
12/31/2018
6/30/2019

Baseline End Date
6/30/2019

Anderson Dam Seismic Retrofit (C1)

Project Number: 61-91864005

Expenditure Plan: *(All values are in Thousands $K)*

Task #	Task Name	FY 2011 - 2021 $Exp	FY 2011 - 2021 $ Open Encum.
0000	All Task	5,669	19,586
-	Re-Allocate	(0)	-
	Subtotal	**5,669**	**19,586**
Planning			
1207	Planning Project Management	9,108	-
1213	Problem Defintion Report	1,042	-
1214	Conceptual Alternatives Report	-	-
1216	Feasible Alternatives Matrix	3	-
1227	Stakeholder Engagement - Planning	134	-
1290	Planning Study Report	5,807	-
1299	Transition Report/Close-Out	-	-
	Subtotal	**16,093**	**-**
Environment			
1313	Environmental Review Process	5,709	-
1321	Environmtl Permit/Agreement	822	-
	Subtotal	**6,531**	**-**
Design			
1407	Design Project Management	14,269	-
1410	Preliminary Design Activity	351	-
1427	Stakeholder Engagement - Design	123	-
1430	30% Design	760	-
1460	60% Design	14,799	-
1490	90% Design	245	-
1493	Final Design	16,586	-
1494	Revised Design for Rebid	4	-
1495	Utility Agreements	8	-
1496	Other Permit/Agreement	3,450	-
1497	Engineer's Report to Board	-	-
1498	Advertise/Award Contract	60	-
1499	Transition Report/Close-Out	-	-
	Subtotal	**50,656**	**-**
Rights of Way			
1510	Rights of Way Mapping	420	-

1520	Real Estate Tasks	6,845	-
1531	ROW Acquisition/Relocation	422	-
	Subtotal	**7,687**	**-**

Construction

1607	Construction Project Management	10	-
1627	Stakeholder Engagement - Const	-	-
1660	Construction Contract Costs	-	-
1665	CM/Inspection	1,188	-
1666	Eng Support During Construction	-	-
1675	Utility Relocations/Other Services	59	-
1678	Reg Compliance & Monitoring	-	-
1680	Survey & Materials Testing	-	-
1685	Plant Estab/Startup & Commiss	-	-
1687	Board Acceptance of Work	-	-
1688	Contract Legal Issues	-	-
1689	Letter of Map Revision	-	-
1692	Complete As-Builts	-	-
1699	Transition Report/Closeout	-	-
	Subtotal	**1,258**	**-**

Close Out

1907	Prepare Closeout Report	-	-
1927	Audits/Reimbursement Claims	-	-
	Subtotal	**-**	**-**

Total Before Inflation	**87,894**	**19,586**
Non 1660 Inflation		
1660 Inflation		
Total Inflation		
Total Expense with Inflation	**87,894**	**19,586**
Inflated Cumulative Annual Total	**87,894**	**107,480**

Granted Amount from Budget:
Project closing in 2023:
Project closing in 2024:

Reimbursements: **Select the column header below and use the Insert button on the Vena ribbon t*

Organization Name	FY 2011 - 2020
	0

Project Expenditure Comments

September 21, 2016 - The Planned Expenditure was revised as per the approved change mana
March 28, 2011 - Table was revised to increase fiscal year 2012 planned expenditure by $2 mi
expenditure table will be revised as the scope of the project becomes more defined.
December 10, 2013 - The Planned Expenditure was revised as per the approved change mana
September 4, 2014 - Task 1100 will be used to develop some templates for consultant agreem
financial analysis for this project. If the charges are significant we will reallocate them across
Expenditures in Task 1660 are for a single construction contract. $326.3M will be encumbered
and then $54.2M in FY23). Inflation of these expenditures is applied based on the first year o
December 12, 2017, per CMM the total project cost increase by $100M ($81M for additional
October 24, 2018: The Planned Expenditures were revised per the approved CMM dated Sept

FY 2022 YTD $Exp	FY 2022 $Exp	FY 2023 $Exp	FY 2024 $Exp	FY 2025 $Exp	FY 2026 $Exp	FY 2027 $Exp	FY 2028 $Exp	FY 2029 $Exp
862								
-								
862								
11								
186								
-								
3								
-								
13								
-								
213	-	-	-	-	-	-	-	-
2,306	6,976	9,348	12,443					
494	400	400	200					
2,801	**7,376**	**9,748**	**12,643**	-	-	-	-	-
1,485	7,206	5,804	4,822					
3,405								
73								
480								
1,038								
154								
3,881	10,520	6,454	8,051					
-								
0								
62		1,100						
-								
139								
-								
10,717	**17,726**	**13,358**	**12,873**	-	-	-	-	-
210								

383	1,032	533	662					
197	8,083	5,000	5,000					
790	**9,115**	**5,533**	**5,662**	-	-	-	-	-

454	1,152			3,761	3,761	3,761	3,761	3,761
-								
64,940	82,881		8,395	78,233	71,058	71,058	71,058	90,898
7,038	7,137			6,867	6,867	6,867	6,867	6,867
-	1,550			3,434	3,434	3,434	3,434	3,434
227								
-								
-								
-								
-								
-								
-								
-								
-								
72,660	**92,720**	**-**	**8,395**	**92,295**	**85,120**	**85,120**	**85,120**	**104,960**

-								
-								
-	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

88,043	**126,937**	**28,640**	**39,573**	**92,295**	**85,120**	**85,120**	**85,120**	**104,960**
	-	-	2,868	1,985	2,707	3,461	4,250	5,074
	-	-	1,607	1,154	1,050	1,050	1,051	1,051
	-	**-**	**4,475**	**3,139**	**3,757**	**4,511**	**5,301**	**6,125**
88,043	**126,937**	**28,640**	**44,048**	**95,434**	**88,877**	**89,632**	**90,421**	**111,085**
	234,417	**263,057**	**307,105**	**402,539**	**491,417**	**581,048**	**671,469**	**782,554**

0

*to add Reimbursements**

FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029

agement memo dated September 14,2016.
illion. The construction cost in fiscal year 2016 was lowered by the same amount. The

gement memo dated November 26, 2013.
nents. This activity will benefit all phases of the project keep this in mind when you do
the phases for reporting purposes.
d over four years starting in FY20 ($101.5M in FY20; $75.3M in FY21; $95.3M in FY22;
f construction (FY20).
construction cost and $19M for CM support).
t. 6, 2018. Construction costs have been revised and moved out by 2 fiscal years (JM).

FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	
$Exp	**$Exp**	**$Exp**	**$Exp**	**$Exp**	**$Exp**	**$Exp**	**$Exp**	**TOTALS**
								25,256
								(0)
								25,256
								9,108
								1,042
								-
								3
								134
								5,807
								-
-	-	-	-	-	-	-	-	**16,093**
								34,476
								1,822
-	-	-	-	-	-	-	-	**36,298**
								32,101
								351
								123
								760
								14,799
								245
								41,611
								4
								8
								4,550
								-
								60
								-
-	-	-	-	-	-	-	-	**94,613**
								420

								9,073
								18,505
-	-	-	-	-	-	-	-	**27,997**

3,761	3,761	3,762						31,252
								-
90,823	79,873	15,397						659,674
6,867	6,867	510						56,906
3,434	3,434	254						25,840
								59
								-
								-
								-
								-
								-
								-
								-
								-
104,885	**93,935**	**19,923**	**-**	**-**	**-**	**-**	**-**	**773,731**

	660	440						1,100
								-
-	**660**	**440**	**-**	**-**	**-**	**-**	**-**	**1,100**

104,885	**94,595**	**20,363**	**-**	**-**	**-**	**-**	**-**	**975,089**

5,935	7,156	2,746	-	-	-	-	-	36,182
721	121	-	-	-	-	-	-	7,805
6,656	**7,277**	**2,746**	**-**	**-**	**-**	**-**	**-**	**43,987**

111,541	**101,872**	**23,109**	**-**	**-**	**-**	**-**	**-**	**1,019,076**

894,095	**995,967**	**########**	**########**	**########**	**########**	**########**	**########**

FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037